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EXAMINER	
SOLAK, TIMOTHY P	

ART UNIT	PAPER NUMBER
3746	17

DATE MAILED: 05/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/528,766	Applicant(s) RADUE, MARTIN L.	
	Examiner Timothy P. Solak	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 April 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 19-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 19-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 March 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Status

The status of the claims in the application cited above is as follows:

- Claim 18 has been canceled.
- Claims 1-17 and 19-24 are pending.

Information Disclosure Statement

The references cited on the information disclosure statement, received on 01/27/2003, have been considered. The papers have been placed of record in the file.

Claim Objections

Claims 16 and 17 are objected to because of the following informalities: recitation of "the permanent magnet", in line 1, is not clear in context. It is unclear as to which of the permanent magnets the term "the permanent magnet" refers. Applicants may wish to consider terminology such as --the pair-- or --one of the said pair-- as a possible solution. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 15 is rejected under 35 U.S.C. 102(b) as being anticipated by Takeshima (4,219,863). Takeshima teaches a reciprocating pump comprising: a drive system including a pair of permanent magnets 4/5 and a coil assembly 1, said coil assembly being energizable to cause reciprocal movement (column 2, lines 63-68) of a drive member 8. Takeshima further discloses a pump assembly 9/10 disposed adjacent to said drive system including means for admitting 9 a supply of fluid into an inner volume (not labeled but clearly seen in Figure 2a as the area surrounding spring 6) of the pump assembly, means for pressurizing the inner volume by reciprocal movement of the drive member (column 2, lines 49-68) and means for expressing 10 pressurized fluid from the inner volume.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waring (4,940,035), in view of Gully et al. (5,032,772). Waring teaches a reciprocating fuel pump (column 3, lines 45-47) comprising: a housing assembly 21/8 including a drive section 21, a pump section 8 (see Figure 2) and a drive assembly 19/20/21 disposed in the drive section (see Figure 3). Waring further teaches said drive assembly includes a permanent magnet 21 (column 4, lines 2-3) and a coil assembly 20 having windings (column 4, lines 5-6) and disposed within a central volume of the drive section adjacent to the permanent magnet and movable reciprocally

axially along a central axis. Waring further discloses a pumping member 17 secured to and movable reciprocally with the coil assembly, the pump member extending into the pump section to produce pressure variations in the pump section during reciprocal movement to draw fuel into the pump section and to express fuel therefrom (column 4, lines 40-45). Although Waring teaches most of the limitations of the claim, including controlling the movement of the pump by altering the signals sent to the windings (column 4, lines 40-45), he does not disclose varying the amplitude of the signals. Gully et al., disclosing a drive circuit for a reciprocating pump, specifically teach controlling the length of the piston stroke and hence the volume rate of the pump by varying the amplitude of an alternating polarity input signal (column 3, lines 55-60). Gully et al. teach controlling the movement of the pump by varying the amplitude advantageously increased the efficiency of the unit (column 3, lines 25-33). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the amplitude control circuit taught by Gully et al., in the pump disclosed by Waring, to have advantageously increased the efficiency of the unit.

With respect to the "imparting force" limitations, Gully et al. teach varying the amplitude controlled the length of the piston stroke and the volume rate of the pump. It was old and well known in the art of pump fabrication that the force of a reciprocation piston pump is a function of the piston position and flow rate of the pump. Such relationships are governed by the laws of physics and can be interchanged through simple mathematical formulas. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used terms of force, in the pump disclosed by Waring, to have advantageously facilitated calculations.

Claim 2-4, 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waring, in view of Gully et al. (both mentioned previously). Waring teaches a reciprocating fuel pump (column 3, lines 45-47) comprising: a housing assembly 21/8 including a drive section 21, a pump section 8 (see Figure 2) and a drive assembly 19/20/21 disposed in the drive section (see Figure 3). Waring further teaches the drive assembly includes a permanent magnet 21 (column 4, lines 2-3) and a coil assembly 20 having windings (column 4, lines 5-6) and disposed within a central volume of the drive section adjacent to the permanent magnet and movable reciprocally axially along a central axis. Waring further teaches a pumping member 19/17 secured to and movable reciprocally with the coil assembly, the pump member extending into the pump section to produce pressure variations in the pump section during reciprocal movement to draw fuel into the pump section and to express fuel therefrom (column 4, lines 40-45).

Waring further teaches the permanent magnet at least partially surrounds a portion of the central volume (inside portion of 21) and extends generally along a central axis (axis of 17, see Figure 3), wherein the coil assembly is disposed radially within the portion of the central volume. Waring discloses the permanent magnet is disposed adjacent to an end of the drive section, wherein the coil assembly is disposed between the permanent magnet and the pump section (see Figure 3). Waring discloses the permanent magnet includes at least one magnet element (top portion of 21 protruding into the central volume). Waring further discloses an inlet 37 and an outlet 30 check valve, both valves being actuated by pressure variations produced by reciprocal movement of the pump member in the pump section (column 6, lines 34-35 and 51-56). Waring discloses a nozzle 14 in fluid communication with the pump section for expressing pressurized fuel from the pump section (column 6, lines 25-26).

Although Waring teaches most of the limitations of the claims, including controlling the movement of the pump by altering the signals sent to the windings (column 4, lines 40-45), he does not disclose varying the amplitude of the signals. Gully et al., disclosing a drive circuit for a reciprocating pump, specifically teach controlling the length of the piston stroke and hence the volume rate of the pump by varying the amplitude of an alternating polarity input signal (column 3, lines 55-60). Gully et al. teach controlling the movement of the pump by varying the amplitude advantageously increased the efficiency of the unit (column 3, lines 25-33). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the amplitude control circuit taught by Gully et al., in the pump disclosed by Waring, to have advantageously increased the efficiency of the unit.

With respect to the "imparting force" limitations, Gully et al. teach varying the amplitude controlled the length of the piston stroke and the volume rate of the pump. It was old and well known in the art of pump fabrication that the force of a reciprocation piston pump is a function of the piston position and flow rate of the pump. Such relationships are governed by the laws of physics and can be interchanged through simple mathematical formulas. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used terms of force, in the pump disclosed by Waring, to have advantageously facilitated calculations.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waring, in view of Gully et al. (both mentioned previously). Waring teaches a reciprocating fuel pump (column 3, lines 45-47) comprising: a housing assembly 21/8 including a drive section 21, a pump section 8

(see Figure 2) and a drive assembly 19/20/21 disposed in the drive section (see Figure 3). Waring further teaches said drive assembly includes a permanent magnet 21 (column 4, lines 2-3) and a coil assembly 20 having windings (column 4, lines 5-6) and disposed within a central volume of the drive section adjacent to the permanent magnet and movable reciprocally axially along a central axis. Waring further discloses a pumping member 17 secured to and movable reciprocally with the coil assembly, the pump member extending into the pump section to produce pressure variations in the pump section during reciprocal movement to draw fuel into the pump section and to express fuel therefrom (column 4, lines 40-45). Although Waring teaches most of the limitations of the claim, including controlling the movement of the pump by altering the signals sent to the windings (column 4, lines 40-45), he does not disclose varying the amplitude of the signals. Gully et al., disclosing a drive circuit for a reciprocating pump, specifically teach controlling the length of the piston stroke and hence the volume rate of the pump by varying the amplitude of an alternating polarity input signal (column 3, lines 55-60). Gully et al. teach controlling the movement of the pump by varying the amplitude advantageously increased the efficiency of the unit (column 3, lines 25-33). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the amplitude control circuit taught by Gully et al., in the pump disclosed by Waring, to have advantageously increased the efficiency of the unit.

With respect to the "fluid pressure" limitations, Gully et al. teach varying the amplitude controlled the length of the piston stroke and the volume rate of the pump. It was old and well known in the art of pump fabrication that the fluid pressure of a reciprocation piston pump is a function of the piston position and flow rate of the pump. Such relationships are governed by the

laws of physics and can be interchanged through simple mathematical formulas. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used terms of "fluid pressure", in the pump disclosed by Waring, to have advantageously facilitated calculations.

Claims 9-11 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waring, in view of Gully et al. (both mentioned previously). Waring teaches a reciprocating fuel pump (column 3, lines 45-47) comprising: a housing assembly 21/8 including a drive section 21, a pump section 8 (see Figure 2) and a drive assembly 19/20/21 disposed in the drive section (see Figure 3). Waring further teaches said drive assembly includes a permanent magnet 21 (column 4, lines 2-3) and a coil assembly 20 having windings (column 4, lines 5-6) and disposed within a central volume of the drive section adjacent to the permanent magnet and movable reciprocally axially along a central axis upon application of alternating polarity signals to the windings (column 4, lines 40-45). Waring further teaches a pumping member 19/17 secured to and movable reciprocally with the coil assembly, the pump member extending into the pump section to produce pressure variations in the pump section during reciprocal movement to draw fuel into the pump section and to express fuel therefrom (column 4, lines 40-45).

Waring further teaches the permanent magnet at least partially surrounds a portion of the central volume (inside portion of 21) and extends generally along a central axis (axis of 17, see Figure 3), wherein the coil assembly is disposed radially within the portion of the central volume. Waring discloses the permanent magnet is disposed adjacent to an end of the drive section, wherein the coil assembly is disposed between the permanent magnet and the pump

section (see Figure 3). Waring further teaches the permanent magnet includes at least one magnet element (top portion of 21 protruding into the central volume). Waring discloses an inlet 37 and an outlet 30 check valve, both valves being actuated by pressure variations produced by reciprocal movement of the pump member in the pump section (column 6, lines 34-35 and 51-56). Waring further discloses a nozzle 14 in fluid communication with the pump section for expressing pressurized fuel from the pump section (column 6, lines 25-26).

Although Waring teaches most of the limitations of the claims, including controlling the movement of the pump by altering the signals sent to the windings (column 4, lines 40-45), he does not disclose varying the amplitude of the signals. Gully et al., disclosing a drive circuit for a reciprocating pump, specifically teach controlling the length of the piston stroke and hence the volume rate of the pump by varying the amplitude of an alternating polarity input signal (column 3, lines 55-60). Gully et al. teaches controlling the movement of the pump by varying the amplitude advantageously increased the efficiency of the unit (column 3, lines 25-33). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the amplitude control circuit taught by Gully et al., in the pump disclosed by Waring, to have advantageously increased the efficiency of the unit.

With respect to the "fluid pressure" limitations, Gully et al. teach varying the amplitude controlled the length of the piston stroke and the volume rate of the pump. It was old and well known in the art of pump fabrication that the fluid pressure of a reciprocating piston pump is a function of the piston position and flow rate of the pump. Such relationships are governed by the laws of physics and can be interchanged through simple mathematical formulas. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made,

to have used terms of "fluid pressure", in the pump disclosed by Waring, to have advantageously facilitated calculations.

Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waring, in view of Gully et al. (both mentioned previously). Although Waring teaches most of the limitations of the claims, including a tubular pump member 17/19 (column 4, lines 1-5) extending from a coil assembly 20 through a bore 16 into a pump section 8, he does not explicitly disclose a seal. It was old and well known in the art of pump fabrication that an ordinary seal between a pump's piston and a pump's cylinder advantageously increased the efficiency of the unit by preventing blow by leakage. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used an ordinary seal, in the pump disclosed by Waring, to have advantageously increased the efficiency of the unit.

Claim 15, 19 and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gladden (3,781,140), in view of Karsten et al. (5,334,910). Gladden teaches a reciprocating pump comprising: a drive system 13/49/45/41-43 including a permanent magnet 49 and a coil assembly 45, said coil assembly being energizable to cause reciprocal movement (column 2, lines 15-20) of a drive member 41/42/43. Gladden further discloses a pump assembly 17/20 disposed adjacent to the drive system (see Figure 1), the pump assembly including means for admitting 14/20 a supply of fluid into an inner volume 31 of the pump assembly, means for pressurizing 21 the inner volume by reciprocal movement of the drive member, and means for expressing 80 pressurized fluid from the inner volume. Gladden further teaches a tubular

member 13 extending from the coil assembly through a sealed bore 17 into the pump assembly including a valve element 20 which seats 29 to seal an inner passageway 14 of the drive member during a pressure stroke thereof. Gladden further discloses an outlet check valve 78 biased 79 into the closed position and opened by an increased in pressure within the inner volume during operation. Gladden discloses a nozzle 80 in fluid communication with the pump assembly for expressing pressurized fluid from the pump assembly. Although Gladden teaches most of the limitations of the claims, including a permanent magnet, he does not disclose a pair of permanent magnets. The unity or diversity of parts depends on the choice of manufacturer and the convenience and availability of the machines and tools necessary to construct the pump. Lacking any limitations prohibiting the use of a single magnet (such as locations of each magnet in the pair), it would have been obvious to one of ordinary skill in the art of pump fabrication to use two smaller magnets to accomplish the same effect. Karsten et al., disclosing a tube surrounded by a permanent magnet, specifically teach a pair of permanent magnets 50/52. Karsten et al. teach the pair of magnets advantageously facilitated assembly of the unit (column 2, lines 5-9). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the magnetic pair taught by Karsten et al., in the pump disclosed by Gladden, to have advantageously facilitated assembly of the unit.

Claims 15 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naoya (JP 07-109975), in view of Karsten et al. (mentioned previously). Naoya teaches a pump assembly with a drive system 16/18/11 including a coil 16 and a permanent magnet 11 surrounding a central volume containing the coil, said coil disposed between the permanent

magnet and a pump assembly 18. Naoya further discloses a pump assembly includes means for admitting 18-1 a supply of fluid into an inner volume 24 of the pump assembly, means for pressurizing 18 the inner volume by reciprocal movement of the drive member, and means for expressing 32 pressurized fluid from the inner volume. Although Naoya teaches most of the limitations of the claims, including a permanent magnet, he does not disclose a pair of permanent magnets. The unity or diversity of parts depends on the choice of manufacturer and the convenience and availability of the machines and tools necessary to construct the pump. Lacking any limitations prohibiting the use of a single magnet (such as locations of each magnet in the pair), it would have been obvious to one of ordinary skill in the art of pump fabrication to use two smaller magnets to accomplish the same effect. Karsten et al., disclosing a tube surrounded by a permanent magnet, specifically teach a pair of permanent magnets 50/52. Karsten et al. teach the pair of magnets advantageously facilitated assembly (column 2, lines 5-9). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the magnetic pair taught by Karsten et al., in the pump disclosed by Gladden, to have advantageously facilitated assembly of the unit.

Response to Arguments

With respect to the double patenting rejection in the previous Office Action, this rejection is withdrawn because the amended claims no longer overlap the "French" patent.

With respect to Claim 20, rejected under 35 USC § 112, applicant's explanation of the "biased" check valve has overcome the Examiner's concerns and the rejection is withdrawn. Accordingly the drawing objections associated with Claim 20 are also hereby withdrawn.

With respect to applicant's arguments directed towards Waring, namely a lack of varying amplitude control, Waring teaches a reciprocating solenoid pumping unit operated by a microprocessor which controls the "alternating polarity electrical driving currents" (column 4, lines 67-68) sent to each of the two pumps comprising the unit. Each individual pump is receiving "alternating polarity electrical driving currents" and therefore meets the limitations of the claims. A well-known advantage to electronic controls lies in the flexibility of the system and the ease at which the control system can be modified and changed. Interchanging or reprogramming of a control system is obvious in view of the teachings of prior art, namely Gully et al. who teaches controlling a pump by varying the amplitude advantageously increased the efficiency of the unit (column 3, lines 25-33). Therefore this argument is not persuasive and the rejection proper.

Applicant's argument that varying the "force" is not related to the movement of a pump's piston, has been considered but is not persuasive. It was old and well known in the art of pump fabrication that the force of a reciprocation piston pump is a function of the piston position and flow rate of the pump. Such relationships are governed by the laws of physics and can be interchanged through simple mathematical formulas. Force, position, flow rate, pressure or stress are all obvious inputs into a control system and to patentably distinguishable one from the

other, structural elements are required to prefer one over the other. Therefore this argument is not persuasive and the rejection proper.

Applicant's arguments with respect to Gladden in view of Waring, namely they do not teach a pair of magnets, has been considered but is moot in view of the new ground(s) of rejection.

Applicant's analogy of a "six-cylinder engine" has been considered, however the unity or diversity of parts depend as much on the choice of manufacturer and the convenience and availability of the machines and tools required, as it does on an inventive step. A four-cylinder engine, may or may not teach a six-cylinder engine.

Applicants have amended Claim 15, including limitations from canceled Claim 18, (i.e. a pair of magnets) in order to define over the prior art structure, however Claim 18 was never indicated as allowable and was rejected under Waring (i.e. at least two magnetic elements). The unity or diversity of parts, in itself is not given much patentable weight, lacking any other structural limitations supporting the part's integrity. Would it have been obvious to make the magnet in two parts? Karsten et al. says yes, and teaches a pair of magnets. Why should the interpretation of the term "pair" be limited to applicants Figures or teachings; while the cutting and stacking of magnets is well documented, such as by Karsten et al. What structural or functional language in the claims requires more than the obvious diversification of the magnet taught by Naoya or Gladden.

Applicant's arguments with respect to claims 2-5, 6-7, 9-14 and 16-18 have been considered but do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections. Therefore these arguments are not persuasive and the rejections proper.

With respect to that which is old and well known, namely an ordinary seal between a pump's piston and a pump's cylinder advantageously increased the efficiency of the unit by preventing blow by leakage, (Claims 5 and 12), a lack of argument is construed as consensus that such limitations are old and well known and further prosecution on such limitations is not required.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Mizuno et al. (5,104,299) teach a solenoid pump with a pair of magnets.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy P. Solak whose telephone number is 703-308-6197. The examiner can normally be reached on Monday through Friday from 10am to 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on 703-308-0102. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-872-9302 for regular communications and 703-872-9303 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0861.

CHARLES G. FREAY
PRIMARY EXAMINER

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May 28, 2003